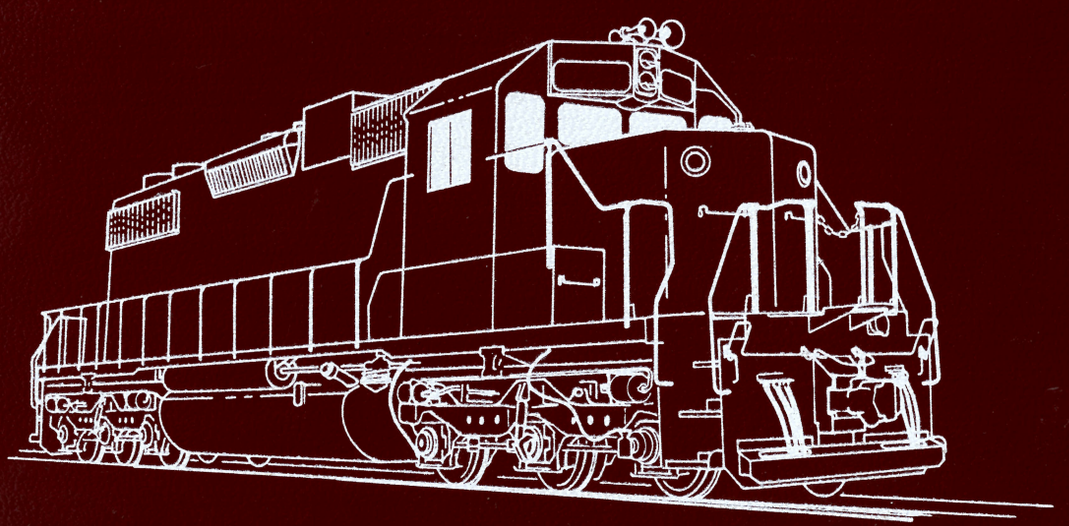
LOCOMOTIVE
SPECIFICATIONS

MODEL SDL38-2



Electro-Motive

GM

LOCOMOTIVE
SPECIFICATIONS

GENERAL MOTORS
MODEL SDL38-2
2195CV (2164 USHP) Gross
2019CV (1991 USHP) Net
SIX MOTOR
DIESEL-ELECTRIC LOCOMOTIVE

Electro-Motive Division
La Grange, Illinois

Specification 9092
September 1978

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AND IDENTIFICATION

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GENERAL INFORMATION AND IDENTIFICATION

MODEL SDL38-2 2195CV (2164 USHP) gross, 2019CV (1991 USHP) net, Six Motor Diesel-Electric Locomotive.

TYPE Association of American Railroads designation (C-C), Common designation (0660).

ARRANGEMENT The general arrangement of the locomotive is shown on General Outline and Clearance Diagram, attached.

The locomotive consists of one unit complete with engine, generator, trucks and all necessary accessories for single unit operation, with a control cab between the long and short hoods.

NOMINAL DIMENSIONS

Distance, pulling face of coupler to centerline of truck	3.83 m (12′ 7″)
Distance between bolster centers	10.36 m (34′)
Truck — rigid wheel base	3.63 m (11′ 11″)
Distance, pulling face front coupler to rear coupler	18.03 m (59′ 2″)
Width over cab sheeting	3.05 m (10′ 0″)
Width over handrail supports	3.13 m (10′ 3⅛″)
Height, top of rail to top of cooling fan guard	4.71 m (15′ 5-7/16″)

DRIVE

Driving Motors	Six
Driving Wheels	6 Pair
Diameter Wheels	1,067 mm (42″)

WEIGHTS AND SUPPLIES

Total loaded weight on rails	21 metric tons per axle (max.)
Fuel	5,678 l. (1,500 US gal.)
Sand	.566 cu. m. (20 cu. ft.)
Cooling water	908 l. (240 US gal.)
Lubricating oil	920 l. (243 US gal.)

CURVE NEGOTIATION Truck swing limits single unit curve negotiation to a 59.4 m (195 ft.) radius curve.

Two units coupled in multiple limited by truck swing to a 59.4 m (195 ft.) radius curve.

SECTION A

AIR SYSTEM

Basic

AIR BRAKES 26L brake schedule including self-lapping independent and standard 26F control valve portions.

BRAKE PIPING Wrought steel pipe with Association of American Railroads fittings are used. Generally, all piping 12.7 mm (½") O.D. and under uses nominal size steel tubing with Society of Automotive Engineers fittings.

EMERGENCY BRAKE VALVE Emergency brake valve is provided.

AIR COMPRESSOR One two stage, three cylinder, water cooled direct coupled compressor, having a displacement of 7.17 cu. m. (254 cu. ft.) per minute at 900 RPM. Compressor is equipped with large oil capacity and disposable intake air filter.

Electric air compressor governor provided to maintain reservoir pressure at prescribed setting.

GAUGES AND TEST FITTINGS Air gauges and test fittings are provided.

MAIN RESERVOIR Two .38 m (15") diameter x 5.98 m (152") steel reservoirs mounted beneath the underframe. Total system capacity: .819 cu. m. (50,000 cu. in.). No. 1 main reservoir equipped with an air operated automatic drain valve. Centrifugal air filters are provided after both main reservoirs.

WARNING DEVICES Single chime diaphragm type air horn. Single bell points forward with lever operated modulating horn valve. Horn is located on center line of cab roof.

Optional

- One 304.8 mm (12") locomotive bell with internal pneumatic ringer, located in underframe.

SECTION B

SANDING

Basic

CONTROL Sanding system is controlled electrically. Manual sanding and automatic sanding in power are provided. Automatic sanding from brake valve handle emergency position is provided.

SWITCHES Manual directional sanding switch is provided.

A separate switch is provided for lead axle sanding only.

SAND TRAPS Eight single line sand traps are provided, four traps for forward movement and four traps for reverse movement. Sand trap cutoff valves are provided. Outside access is provided for trap maintenance.

SAND CAPACITY Two sand boxes with a total capacity of .566 cu. m. (20 cu. ft.).

Sand boxes are filled from the outside of locomotive on top of hoods.

SECTION C

MULTIPLE UNIT CONTROL Optional

- Multiple control equipment allows operation of two or more units from one cab. Locomotive equipped with one 27 point power plant receptacle per end, and one power plant jumper cable.

  Power plant receptacle is located in the end plate at both ends.

  A solid (fixed) multiple unit walkway ramp is provided at both ends. Folding multiple unit walkway ramps are available.

  End arrangement includes multiple unit hand railing and guard chains at both ends.

- A-1 charging cutoff pilot valve for break-in-two protection.

- Automatic timed sanding from A-1 charging cutoff pilot valve and/or automatic brake valve.

SECTION D

DYNAMIC BRAKES OPTIONAL

- Variable dynamic brakes use the traction motors as generators, with the power being dissipated through force ventilated grid resistors mounted in hood above engine. Variable voltage type control is standard with dynamic brakes.

  Positive indication of "power" or "dynamic brake" mode of operation is clearly shown at controller. Ammeter containing both "brake" and "power" indication is provided.

  A grid current trainline control feature is available, if desired.

- Extended range dynamic braking providing high brake effort at low speed is available.

- A self load test feature permitting locomotive loading on its own dynamic brake grids is available.

- Grid blower protection is available preventing dynamic brake operation as result of stalled blower motor or no motor current.

SECTION E

ELECTRICAL SYSTEM

Basic

MAIN GENERATOR EMD alternating current main generator, with rectified output for delivery to traction motors; 600 volt (nominal) direct current rating, ventilated by blower. Armature shaft supported by single bearing with direct connection to engine crankshaft through alternator rotor and flexible coupling. Adequate capacity to continuously transmit the rated output of the engine under all conditions for which the locomotive is designed.

GENERATOR EXCITATION Excitation for main generator supplied from the alternator through silicon controlled rectifiers.

ALTERNATOR EMD 200 volt, 3 phase, 16 pole alternator, built integral with main generator, to supply alternating current power for engine cooling fan induction motors, main generator excitation, and inertial separator exhaust fan.

LOCOMOTIVE CONTROL Permanent series parallel with automatic operation of single step of shunting. High voltage circuits safeguarded by ground protective relay. Full range wheel slip control with automatic sanding under wheel slip conditions.

LOAD CONTROL Load control provided to automatically maintain horsepower output in accordance with the published tractive effort characteristics of this locomotive.

ELECTRICAL CONTROL CABINET A totally enclosed, readily accessible cabinet houses the locomotive high and low voltage control equipment. Fault annunciator module is provided within the cabinet to indicate equipment malfunction. Cabinet is ventilated from the blower air supply through paper filters.

Control equipment includes a full complement of control circuit plug-in modules, high capacity power contactors and transfer switches.

An additional cabinet, mounted in the engine room, houses the control equipment for the radiator cooling fan motors. Fuse protection is provided for cooling fan motors.

SECTION E

ELECTRICAL SYSTEM

Basic

TRACTION MOTORS Six EMD direct current, series wound, forced ventilated, axle hung motors with roller type armature bearings.

STORAGE BATTERY 32 cell, 64 volt, 420 ampere hour capacity (8 hour rating) battery housed in two boxes located under catwalks adjacent to short hood.

BATTERY BOX Two battery boxes are provided, one on each side of the short hood. Trap doors in catwalk provided for servicing and bolted removable panels provided for removing batteries. Ventilation and drainage provided. Battery boxes are sized to fit either 17 or 25 plate batteries.

AUXILIARY GENERATOR 18 KW alternating current auxiliary generator, driven from engine gear train, provides rectified 74 direct current for control circuits, lighting and battery charging. Voltage automatically controlled by static voltage regulator.

Optional

- Traction motor lockout.
- Push-to-test lights on engine control panel.

SECTION F

ENGINE SYSTEM

Basic

ENGINE General Motors sixteen cylinder, 2 cycle diesel engine. Power assemblies arranged in 45 degree V, with 230.19 mm (9-1/16") bore, 254 mm (10") stroke, and unit injection. Roots blower scavenging through cylinder wall intake, and multivalve exhaust. Water cooled cylinder liners and heads, oil cooled pistons, ten bearing crankshaft, drop forged connecting rods, and floating piston assembly. Isochronous governor speed control, separate overspeed trip and high crankcase pressure protection.

CARBODY FILTERS An inertial separator, roof mounted in a separate compartment behind the cab, supplies filtered intake air to major components. The separated contaminants are blown out by an alternating current fan incorporated in the separator. Filtered air is supplied to the combination traction motor and main generator blower and the engine air filters. Traction motor air is delivered to a duct and plenum chamber system on the underframe and supplies the traction motors with cooling air. The main supply air duct forms the left side walkway. Generator discharge air is used to pressurize the engine compartment.

ENGINE AIR INTAKE FILTERS Disposable paper or fiberglass filter elements provided for engine intake air.

ENGINE FUEL SYSTEM Return flow, single direct current motor driven gear pump, protected by suction strainer, and discharge filters with filter by-pass and indicator to insure clean fuel for the engine. Sight glasses permit visual inspection of fuel flow, and relief valve offers protection against excessive pressures.

ENGINE LUBRICATION The engine lubricating oil system is a pressure system using two positive displacement gear type pumps combined in a single unit. One pump delivers oil for the pressure lubricating system, the other for piston cooling. The oil supply to these pumps is drawn from the oil strainer chamber through a common suction pipe.

A scavenging oil pump is used to draw oil from the engine oil pan through a strainer, pump it through the full flow lube oil filter to the cooler core section of the cooler tank and return it to the strainer chamber. Low oil pressure and high oil temperature protection are provided resulting in engine shutdown.

SECTION F

ENGINE SYSTEM

Basic

ENGINE COOLING Pressurized cooling system consisting of direct driven centrifugal water pump on the engine, radiators, and alternating current motor driven cooling fans located above radiators at rear of long hood. Water cooled oil cooler and water tank mounted as a unit directly in rear of the governor end of engine, automatic water temperature control, hot engine alarm, and engine shutdown in the event of low water level, are included. Water fill system designed to prevent inadvertent opening of the pressure cap. Water level inspection window provided in hood.

ENGINE EXHAUST EMD spark arrestor manifold including carbon retention trap.

ENGINE STARTING Engine is started using two 32 volt series connected motors, energized by the locomotive storage battery. Engine start switch at governor end of engine.

ENGINE TURNING JACK One provided per unit.

Optional

- Fuel oil preheater.
- Immersion heater.
- Engine purge control system.

SECTION G

TRUCKS

Basic

TRUCK ASSEMBLIES Two flexible three motor, six wheel, high traction truck assemblies are provided per locomotive.

Journal springs offer a relatively soft suspension with lower wheel load variation to reduce wheel slip. Accessible shock absorbers between truck frame and middle axle journal boxes minimize undesirable vertical bounce. Lateral and vertical snubbing of the carbody is transferred through a larger diameter center bearing, "H" shaped bolster and obtained from the damping characteristics of the four secondary rubber sandwich type suspension pads between truck frame and bolster.

Each of the traction motors is oriented in the same direction and each motor rests on a separate transom where a special suspension provides a flexible support, dampening the torque shocks of the motor. This one-way motor positioning contributes to minimal weight transfer between axles and offers improved adhesion characteristics and ease of maintenance.

TRUCK BRAKES Single shoe type brake rigging provided on each wheel, operated by four truck frame mounted brake cylinders. Brake cylinders at one end operate two brake shoes each. The remaining two cylinders operate one brake shoe each.

PEDESTALS Lined with composition nylon plates bolted to frame.

PEDESTAL TIE BARS Fitted and applied at the lower end of the pedestal legs, held in position by bolts.

TRUCK CENTER BEARING RECEPTACLE Truck center bearing receptacle provided with wear plates and dust guard.

SIDE BEARINGS Friction type side bearings.

INTERLOCKS Body and truck interlocks provided, serving as antisluing device in case of derailment.

BOLSTER SPRINGS Rubber sandwich type pads.

BRAKE PINS All pins and bushings hardened and ground.

SECTION G

TRUCKS

Basic

HAND BRAKE Hand brake provided for the locomotive operates on one brake cylinder only. Both trucks provided with lever for hand brake connection, making trucks interchangeable.

WHEELS Rolled or cast steel, heat treated, rim quenched, 1,067 mm (42″) diameter with 64 mm (2½″) rim. Wheel treads are finished smooth and concentric.

AXLES Axle material conforms to physical properties of current Association of American Railroads specifications.

JOURNAL BOXES Locomotives equipped with Hyatt, oil lubricated, cylindrical roller bearing journal boxes. Crowned rollers extend bearing life. Lateral thrust is taken through a cushioning arrangement directly by the box with improved oil flow over thrust block characteristics. Journal box pedestal guides provided with spring steel wear plates.

SLACK ADJUSTERS Pin type slack adjusters.

Optional

- Provision for wheel truing.
- Gear case inspection covers.
- Thick rim wheels suitable for retyring.
- Hydraulic wheel removal.

SECTION H

CAB

Basic

CONSTRUCTION Cab is of fabricated steel construction.

CAB SEATS The two wall mounted upholstered cab seats have forward and backward as well as height adjustments. Both seats can be turned 180 degrees. Arm rests are provided outside the side windows.

CAB HEATING AND VENTILATING Electric cab heaters and defrosters with fan driven air circulating system. Each heater is provided with four position switch for control of heating and defrosters. Cab ventilators are provided.

INSULATION Ceiling is lined with perforated metal for sound reduction; backed up by insulation. Acoustic and thermal type insulation is added to the cab side walls and the rear partition of the electrical cabinet.

FLOORING The cab floor is comprised of plywood covered with linoleum and is elevated above the top of the underframe.

DOORS Doors are located at diagonally opposite corners leading to platform alongside of hoods. A trap door in cab floor and side drop doors provide access to equipment beneath cab floor.

DOOR LOCKS The cab doors are fitted with an inside latch and provided with a lock. Doors are of honeycomb construction.

WINDOWS Divided center window is provided over low short hood. Side windows on both sides of cab are sliding double sash type and fitted with latches. End windows in doors and cab are stationary and set in a special rubber retainer. All windows and doors are provided with safety plate glass.

WINDOW WIPERS Total of six air operated window wipers are provided for front and rear windows on both sides of cab and center windshields.

DRIVER'S CONTROL STATION Driver's station set up for left hand drive, short hood forward. Control station, located conveniently to the right of the driver's seat, includes the engine speed throttle, locomotive reverse lever, automatic and independent brake valve. The lever arrangement is such that the throttle must be in idle before the reverse lever can be removed to isolate the controller. The horn valve, bell valve (if applied) and independent sander switch are also located in the control stand.

SECTION H

CAB

Basic

DRIVER'S CONTROL SWITCHES Control and lighting switches located within reach of the driver, including switches for control and fuel pump, generator field, engine run, gauge lights, headlight "bright" front and rear, headlight "dim" front and rear. Engine stop, number and class light and isolation switches located on rear cab wall. Cab heater switches are located on cab heaters, providing individual control.

DRIVER'S INSTRUMENT PANEL A lighted instrument panel is provided on top of the driver's controller containing air brake gauges, wheel slip light, pneumatic control switch (PCS) "open" light, sand light and the traction motor load indicating ammeter.

MISCELLANEOUS

- Two coat hooks provided in cab.
- Padded sun visors on driver's side of cab.

Optional

- Third cab seat.
- Water cooler and/or refrigerator.
- Awnings/wind deflectors.
- Speed recorder/Indicator.
- Hot plate.
- Roof cab ventilators.

SECTION I

CARBODY

Basic

FRAMING Underframe is of constant section design and serves as main carrying member for hoods, cab and equipment. Two channel side sills supported by center sills support catwalk alongside of hoods. Draft gear pockets are welded to the built-up platform construction between center sills. The structure is all welded construction.

FLOORING Floor plates with antiskid surface are welded to underframe on end platforms and alongside of hoods.

UNDERFRAME CENTER BEARINGS Welded to body bolster assembly.

LONG HOOD The power plant compartment is designed to a minimum width to provide a walkway around the hood. Doors are provided which give access to power plant equipment and allow removal of complete power assemblies. Hatches supporting cooling fans can be removed separately for removal of radiators. The hood is bolted to the inertial filter compartment and to the deck and can be removed complete with radiators and cooling fans for major repairs. When provided, dynamic brake hatch can be removed separately.

HOOD DOORS All side doors have outside hinges and latches.

LIFTING EYES Provision is made for lifting eyes on hood and hatches to facilitate handling with a crane.

SIDE STEPS Side foot boards and platform mounting steps are provided at each corner of locomotive.

SECTION I

CARBODY

Basic

UNCOUPLING DEVICE Each end of the locomotive is provided with a top operating device arranged to operate from either side of the locomotive.

COUPLERS Type "E" 158.75 mm (6¼") x 203.2 mm (8") shank, 723.9 mm (28½") long. Maximum swing of coupler is 19° to either side of centerline.

DRAFT GEAR National Castings NC-391 rubber draft gear without alignment control.

HEADLIGHT Twin sealed-beam headlights, front and rear, are equipped with two 200 watt, 30 volt sealed-beam units. Bright and dimmer switch for each light provided in operator's cab.

CLASSIFICATION LIGHTS Classification lights built into each corner of front and rear hood.

NUMBER BOXES Four lighted number boxes, two on each end of locomotive, mounted at an angle for both forward and side visibility.

LOCOMOTIVE LIGHTING Lights and outlets are as follows:

1. Two ceiling cab lights
2. Two engine room lights
3. Eight number lights
4. Three gauge lights
5. Outlet receptacles: one in engine room, one in cab
6. Two short hood compartment lights
7. Four classification lights
8. Four side footboard lights

FIRE EXTINGUISHERS Two 20 lb. dry powder type, one located in cab, the other in the engine compartment.

JACKING PADS Combination jacking pad and cable sling is provided near each bolster at side sill.

BALLAST The locomotive is basically designed for balance.

Optional

- Snow plows.
- Signal light/roof top beacon.
- Lifting eyes in the end plates.
- Marker and flag brackets.

SECTION J

FUEL TANK

Basic

5,678 l. (1,500 US gal.) capacity, fuel tank built of heavy gauge steel, with baffle plates, located underneath the locomotive body. One filling station on each side. Tank equipped with venting, cleanout plug, and nonremovable water drain.

One dial type fuel gauge on right side of tank and one direct reading type fill sight glass on each side of tank. Each filling station provided with electric emergency fuel cutoff actuating button. Similar pushbutton located in cab. When operated, engine stops immediately.

Optional

- 9,463 l. (2,500 US gal.) fuel tank.
- Automatic fill adapters.

SECTION K

STYLING AND PAINTING

Basic

OUTSIDE FINISH	Acrylic lacquer except for the fuel tank, air reservoirs, trucks and other undercarriage surfaces, which are enamel.
ENGINE ROOM	Inside finished in suede gray. All air, fuel, water and lube oil piping color coded at points of connection.
UNDERCARRIAGE	Black unless otherwise specified.
CAB	Inside finished in suede gray.
TRUCKS & TANKS	Black unless otherwise specified.

PERFORMANCE DATA

GEAR RATIO	62:15
MAXIMUM SPEED	110.8 KPH (68.9 MPH)
MINIMUM CONTINUOUS SPEED	13 KPH (8.0 MPH)

OPTIONAL GEAR RATIOS

The choice of gear combinations will depend upon the service contemplated. Other gear ratios are available.

HORSEPOWER RATING

The SDL38-2 locomotive develops a nominal 2195 Cheval Vapeur (2164 USHP) at 900 engine RPM and delivers 2019 Cheval Vapeur (1991 USHP) to the generator for traction under the following conditions:

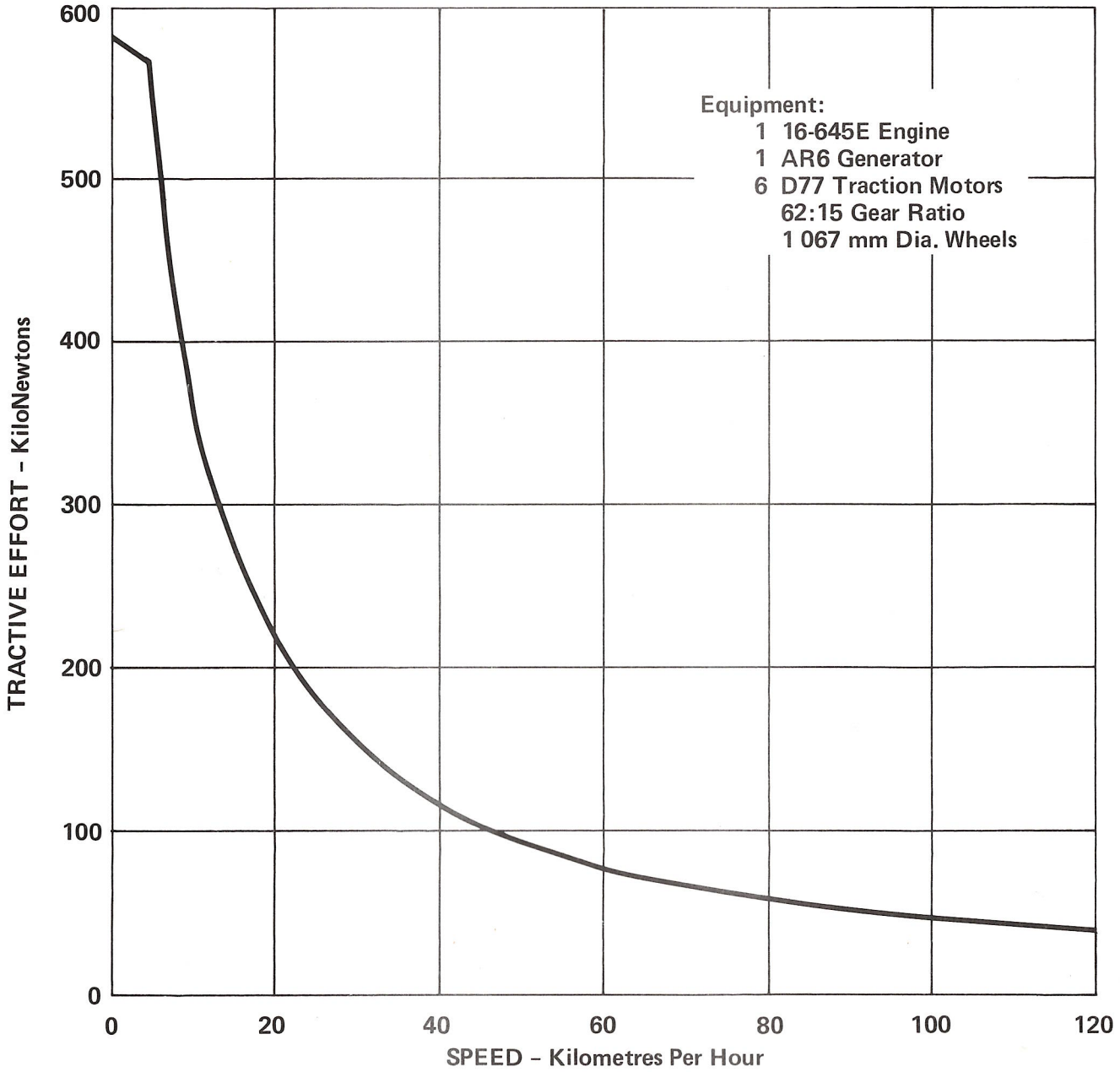
20°C (68°F) air intake temperature
736 mm (28.98") hg barometer (minimum)
0.845 specific gravity fuel
.87 engine governor rack setting
20°C (68°F) fuel temperature

General Motors Corporation

SPEED - TRACTIVE EFFORT

SDL38-2 Export Locomotive

UIC Conditions



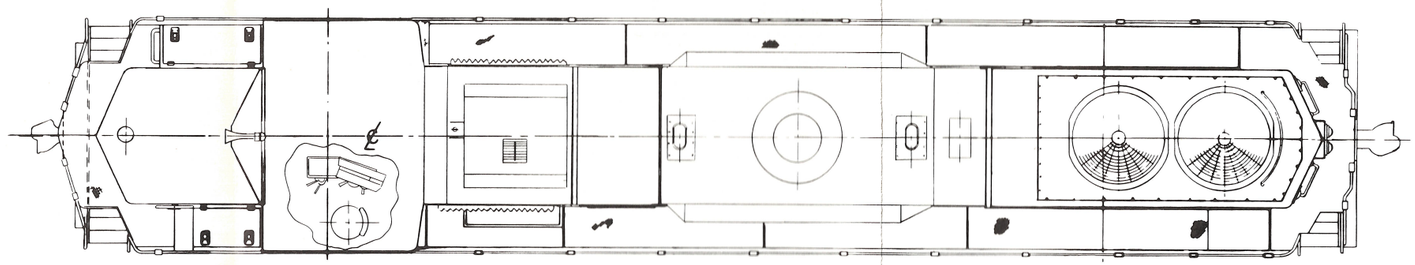
MODEL SDL38-2 DIESEL ELECTRIC LOCOMOTIVE

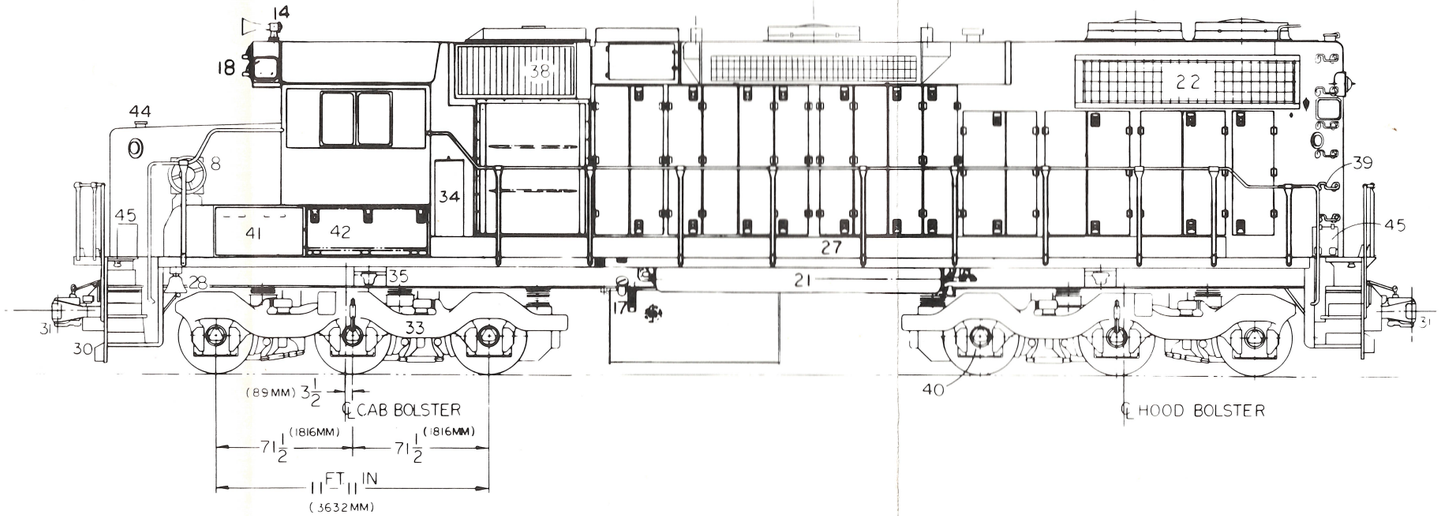
LEGEND

1. Engine 16-645E
2. Generator-Alternator AR6/D14
3. Traction Motor - Generator Blower
4. Auxiliary Generator (18 KW A.C.)
5. Electrical Control Cabinet
6. Air Compressor
7. Engine Exhaust Stack
8. Handbrake (Wheel Type)
9. Traction Motor (D77-6 Total)
10. Lube Oil Cooler
11. Engine Water Tank
12. 48 Inch Cooling Fan
13. Radiator
14. Horn
15. Exhaust Manifold
16. 42 In. Dia. Wheels (1,067 mm)
17. Fuel Filler
18. Headlight
19. Lube Oil Strainer
20. Fuel Tank 1500 U.S. Gallons (5,678 Liters)
21. Main Air Reservoirs
22. Cooling Air Inlet & Shutters
23. Lube Oil Filter
24. Engine Air Filter
25. Inertial Air Separator (20 cells Total)
26. Number Box
27. Traction Motor Air Duct
*28. Bell
29. Draft Gear NC-391 (No Alignment Control)
30. Pilot
31. Coupler (E-Type)
32. Fuel Filter
33. Truck - GHC Single Shoe
34. Electrical Cabinet Air Filter
35. Jacking Pads
*36. MU Receptacle
37. Class Lights
38. Air Inlet Screen
39. Roof Access
40. Journal Boxes
41. Battery Box
42. Air Brake Equipment Access
43. Sand Boxes 20 cu. ft. Total (.566 cu. m.)
44. Sand Filler
45. Sand Trap Access
46. Engine Room Partition
*47. Dynamic Brake Fan
*48. MU End Arrangement

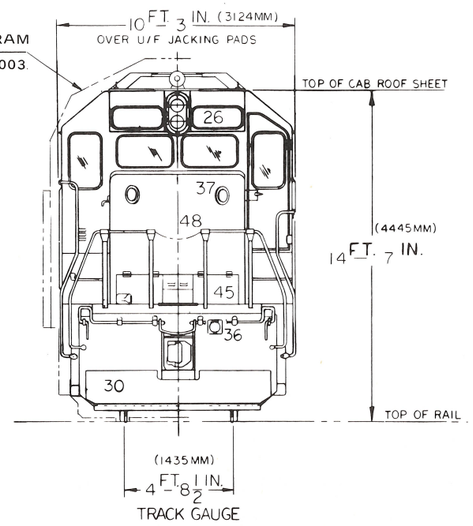
*Modifications

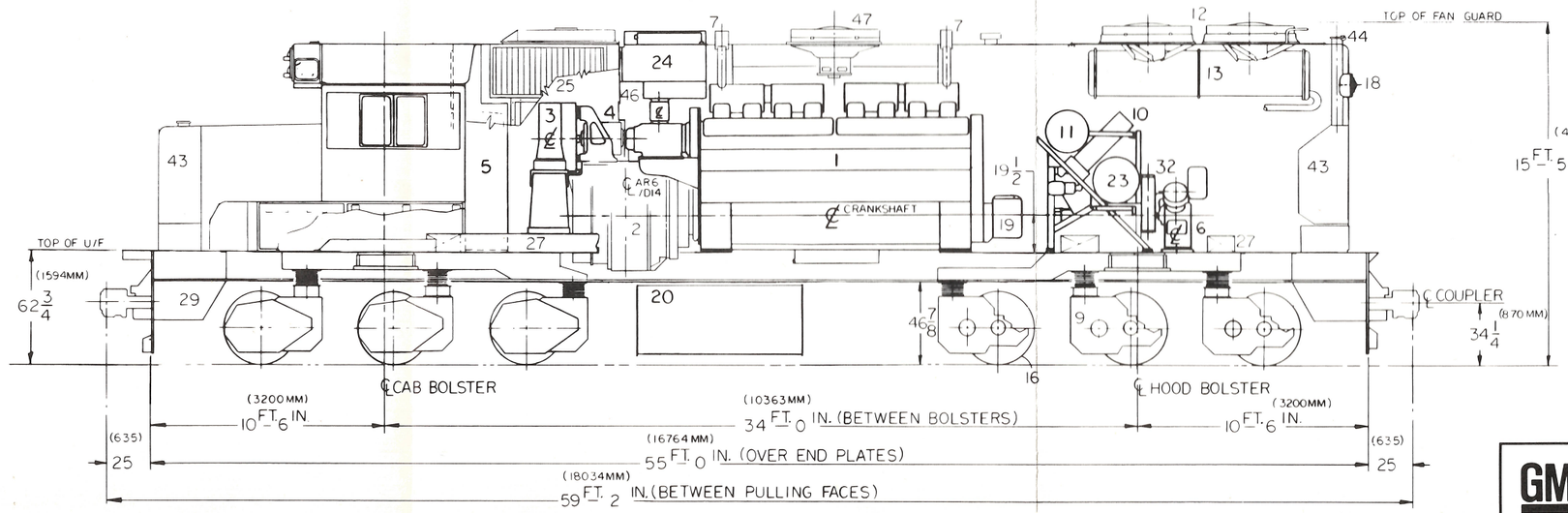
NOTE:
Locomotive Height Tolerance = ±1-1/2 in.
Locomotive Width Tolerance = ±1/2 in.
Truck Lateral at Bolsters = ±1-3/8 in nom.
Locomotive is shown including half variable supplies and in new condition standing still on level and tangent track.





CLEARANCE DIAGRAM
P.R.C. DR'WG. 581-6003





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NOTE: ALL DIMENSIONS SHOWN IN PARENTHESES ARE MILLIMETER EQUIVALENTS.

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